MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017/2018

BMT1024 – ADVANCED MANAGERIAL MATHEMATICS

(All section)

12 OCTOBER 2017
9.00 a.m – 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **FOUR (4)** printed pages excluding cover page with 2 sections only.

2. **Section A – 10 Multiple Choice Questions (20 Marks).**
   Instruction: **Answer ALL the questions.** Shade your answer in the OMR sheet provided.

3. **Please Section B – 3 Structured Questions (80 Marks).**
   Instruction: **Answer ALL the questions.** Write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.

SECTION A – MULTIPLE CHOICES (20 Marks)

There are 10 questions in this sections. Answer all the questions on the multiple choice answer sheet.

1. What is the slope for $x - 18 = -3y$?
   a) -2
   b) 1
   c) 2
   d) -1
2. Given $f(x) = \begin{cases} x+2 & x < 0 \\ x^2 & x \geq 0 \end{cases}$, find the values of $f(3)$ and $f(-1)$.
   a) $f(3) = 5; f(-1) = 1$
   b) $f(3) = 9; f(-1) = 2$
   c) $f(3) = 9; f(-1) = 1$
   d) $f(3) = 5; f(-1) = 2$
3. Given the quadratic function $f(x) = x^2 + 2x - 15$, determine whether the parabola opens upward or downward and find the vertex of the parabola.
   a) Open upward, $(-1, -16)$
   b) Open downward, $(-1, -16)$
   c) Open upward, $(-16, -1)$
   d) Open downward, $(-16, -1)$
4. If $5^y = 7$, then y ?
   a) $y \approx 0.97$
   b) $y \approx 1.21$
   c) $y \approx 1.43$
   d) $y \approx 0.57$
5. Solve for $2^x - 3 = 10$.
   a) 4.00
   b) 3.70
   c) 3.50
   d) 0.27
6. What is the size of the matrix $A = \begin{bmatrix} 2 & 5 \\ 3 & 0 \\ 1 & -1 \end{bmatrix}$?
   a) 3×2
   b) 2×3
   c) 2×4
   d) 4×2

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7. If A is a 2×3 matrix, and B is a 3×4 matrix, how many columns does AB have?
   a) 2
   b) 3
   c) 4
   d) 8

8. Two matrices A and B are multiplied to get AB if
   a) both are rectangular
   b) both have same order
   c) no of columns of A is equal to columns of B
   d) no of rows of A is equal to no of columns of B

9. In Gaussian reduction procedure, matrix A is augmented with an identity (mxm) as
   a) (A | I)
   b) (B | N)
   c) (B | I)
   d) (I | B)

10. System of equation in form of AX = B is solved for solution set as
    a) $A^{-1}AX = A^{-1}B$
    b) $B^{-1}AX = A^{-1}B$
    c) $AB^{-1}AX = AB^{-1}X$
    d) $X^{-1}AB = A^{-1}BX$

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SECTION B – STRUCTURED QUESTIONS (80 Marks)

Question 1 (25 marks)

Solve the linear programming (LP) problem by using the simplex algorithm.

$$\begin{aligned} \text{Maximize} \quad & Z = 5x_1 + 4x_2 \\ \text{Subject to} \quad & \\ & x_1 + x_2 \leq 20 \\ & 2x_1 + x_2 \leq 35 \\ & -3x_1 + x_2 \leq 12 \\ & x_1, x_2 \geq 0 \end{aligned}$$

Question 2 (25 marks)

a. Anggerik Condominium has 250 apartments to rent. If they rent x condominiums then their monthly profit, in dollars, is given by:

$$P(x) = -8x^2 + 3200x - 80000$$

How many condominiums should they rent in order to maximize their profit? (7 marks)

b. The cost of producing x units of a certain product is given by:

$$C(x) = 5x^3 - 500x + 10000$$

Find the value of x that gives the minimum average cost. (9 marks)

c. Given the demand function $p = 1200 - q^2$. Compute the coefficient of elasticity of demand at p = 300. Is the demand elastic? (9 marks)

Question 3 (30 marks)

a. The total weekly revenue (in dollars) of the Super Hardware store with manufacturing and selling hardware products is given by:

$$R = x^3 - 3x^2y + 3xy^2 + y^2$$

Compute $\frac{\delta R}{\delta x}$ and $\frac{\delta R}{\delta y}$ when $x = 150$ and $y = 350$. (6 marks)

b. Suppose that x units of one input and y units of a second input result in

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$$P = x^2 + \frac{3}{2}y^2 - 120x + 50y - xy$$

units of product. Determine the inputs of x and y that will maximize P. What is the maximum production? (7 marks)

c. The demand function is given by :

$$p = -0.01x^2 - 0.2x + 13$$

Where p is the unit price in dollars and x is the quantity demanded each week measured in units of a hundred. Determine the consumers' surplus if the market price is set at \$10 per unit. (8 marks)

d. Suppose the supply function for x million units of a product is given as:

$$p = x^2 - 34 \text{ (Dollars per unit)}$$

If the equilibrium price is \$30 per unit, what is the producers' surplus? (9 marks)

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